



**National Science Foundation**  
**4201 Wilson Boulevard**  
**Arlington, Virginia 22230**

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## **Dear Colleague Letter: Sustainable Materials**

The **Division of Materials Research (DMR)** is excited to bring to your attention a new opportunity focused on sustainable materials. **Sustainable Materials** is DMR's effort in ***Sustainable Chemistry, Engineering, and Materials*** (SusChEM), a cross-directorate initiative aimed at enabling the basic science and engineering discoveries that will reduce dependence on non-renewable resources and improve the efficiency of industrial processes. SusChEM is a component of the larger NSF-wide investment in the area of ***Science, Engineering and Education for Sustainability*** (SEES).<sup>1</sup> In addition to **Sustainable Materials**, similar efforts are on-going in Sustainable Chemistry and Sustainable Engineering under the SusChEM umbrella.<sup>2</sup>

Research projects that target the discovery of new materials or make materials more sustainable through improved synthesis, enhanced applications, and/or advances in lifecycle management are encouraged. Broader impacts are sought that advance the field beyond traditional paradigms of materials optimization, and include educational and outreach activities aimed at broadening exposure, increasing awareness and improving knowledge in the area of sustainability. While some research topics are suggested below, submissions of other projects on sustainable materials, sustainability of materials or critical elements are also welcome.

***Materials for the Preservation and Extension of Natural Resources***, which includes fundamental materials research to discover or improve current materials to:

- Enhance recyclability, reuse, repurposing, and/or reclamation of current materials or material systems,
- Increase the conservation of natural resources, such as water, raw materials, and energy,
- Reduce carbon emissions, pollution and other effluents,
- Extend the durability, lifetime, or enhance the biodegradability of current materials;

***Material Replacement for a Safer and more Secure Future***, which includes fundamental materials science research to maintain current materials functionality while reducing negative impacts to the environment and/or promoting sustainable living through:

- Elimination of toxic elements/materials in current/next generation materials,
- More efficient and sustainable processing in terms of energy and materials usage,
- Retention of desired functionality with processing at ambient conditions (as opposed to extreme temperatures, pressures or other harsh environments);

***Improved Materials during Operating Conditions***, which includes fundamental materials science research aimed to discover and develop new materials or material systems that:

- Increase the lifetime of materials, including those utilized in extreme or harsh conditions,
- Improve the performance of materials in terms of oxidation, corrosion or wear resistance; hardness; toughness; radiation resistance; etc.,
- Extend the operational range of materials to increase efficiency or efficacy,
- Identify the triggers that degrade material properties, and improve understanding to control the trigger events and/or reactions to them;

**Materials Designed for Zero Waste**, which includes fundamental materials research aimed at improving the anthropogenic lifecycle design of materials where end-of-use is a primary consideration. Topics of interest include:

- New materials or combinations of materials designed for more efficient reclamation, repurposing, recycling or reuse,
- New materials or materials synthesis methods that minimize waste and/or emphasize the use of bio-related materials, and
- Increasing the self-sensing, self-repairing and/or self-healing (smart) properties of materials for detection and warning for repair or replacement under normal, extreme or harsh conditions.

Proposals in Sustainable Materials should be submitted within the open window (September 1 - October 31, 2012) to a topical research program within DMR (Biomaterials, Ceramics, Condensed Matter and Materials Theory, Condensed Matter Physics, Electronic and Photonic Materials, Metals and Metallic Nanostructures, Polymers, or Solid-State and Materials Chemistry). While proposals submitted to DMR (as the lead program, i.e. those with a DMR program listed first on the cover page) must be primarily focused on fundamental materials research, collaborations with other disciplines (Chemistry; Engineering; Social, Behavioral, and Economic Sciences; etc.) are welcome.

Proposals are invited from either single investigators or multiple investigators, e.g., as focused research groups (FRGs).<sup>3</sup> While not required, ties with industry, national laboratories, or other organizations are encouraged. If there are strong collaborations with industry, the Grant Opportunities for Academic Liaison with Industry (GOALI)<sup>4</sup> solicitation can be used in conjunction with this effort. Similarly, proposals may be submitted in combination with the Research in Undergraduate Institutions (RUI)<sup>5</sup> solicitation. Per the guidance on the Division's website, DMR discourages the submission of more than one proposal from the same Principal Investigator during the proposal-submission window.

Inquiries about Sustainable Materials may be sent to [SusChEM.DMR@nsf.gov](mailto:SusChEM.DMR@nsf.gov). Titles of proposals submitted in response to this Dear Colleague Letter should start with "SusChEM:".

We are excited by the opportunities created by the SusChEM effort and the contributions that will be made in the area of Sustainable Materials.

**Ian Robertson, Ph.D.**

Division Director  
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1. Science, Engineering and Education for Sustainability (SEES) -  
[http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=504707](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504707)

2. Sustainable Chemistry, Engineering, and Materials (SusChEM) -  
[http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=nsf12097](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf12097)

3. Focused Research Groups: <http://www.nsf.gov/mps/dmr/awards/frgs.jsp>

4. Grant Opportunities for Academic Liaison with Industry:  
[http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=nsf12513](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf12513)

5. Research in Undergraduate Institutions: [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=nsf00144](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf00144)